

Claims:

1. Printing ink, comprising at least one dye or pigment having at least one absorption maximum in the visible range of the electromagnetic spectrum which is substantially different from the absorption maxima of the base colors of the CIEXYZ system and/or having an absorption band in the visible range of the electromagnetic spectrum whose band width at half intensity is narrower than 2400 cm^{-1} , preferably narrower than 2000 cm^{-1} , and most preferably narrower than 1500 cm^{-1} .
2. Printing ink according to claim 1, further comprising at least one other dye or pigment having at least one absorption maximum in the ultraviolet or in the infrared region, preferably in the near-infrared region of the electromagnetic spectrum.
3. Printing ink according to any one of claims 1 or 2, comprising at least three, preferably at least four different dyes or pigments having absorption spectra which are substantially different from each other.
4. Printing ink according to any one of claims 1 to 3, comprising at least two, preferably at least three different dyes or pigments having at least one absorption maximum in the infrared range, preferably the near-infrared range of the electromagnetic spectrum.
5. Printing ink according to any one of claims 1 to 4, comprising at least four different dyes or pigments having at least one absorption maximum in the visible range of the electromagnetic spectrum.

6. Printing ink according to any one of claims 1 to 5, further comprising a reflecting pigment.
7. Set of printing inks, comprising at least two printing inks according to any one of claims 1 to 6.
8. Set of printing inks according to claim 7, comprising at least three, preferably at least four different printing inks according to any one of claims 1 to 5 each having a dye or pigment which is different from the dyes or pigments in the other printing inks.
9. Set of printing inks according to claim 8, wherein the different dyes or pigments have at least one absorption maximum in the visible range of the electromagnetic spectrum.
10. Set of printing inks according to any one of claims 6 to 9, wherein at least one printing ink, preferably at least two and more preferably at least three printing inks comprise a dye or pigment having at least one absorption maximum in the ultraviolet or in the infrared region, preferably in the near-infrared region of the electromagnetic spectrum.
11. Set of printing inks according to any one of claims 6 to 10, wherein at least one printing ink comprises a reflecting pigment.
12. Method for marking an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good, comprising the step of providing on said article a marking which is applied by using at least one printing ink according to any one of claims 1 to 6 or a set of

printing inks according to any one of claims 7 to 11 or by using at least one coating composition comprising at least one printing ink according to any one of claims 1 to 6 or a set of printing inks according to any one of claims 7 to 11.

13. Method according to claim 12, wherein said at least one coating composition is selected from the group consisting of pasty inks comprising intaglio inks, letterpress inks, and offset inks, from the group consisting of liquid inks comprising screen printing inks, helio-flexo inks, and gravure inks, from the group consisting of toners for electrostatic or electrophoretic printing, or from the group consisting of ink-jet inks comprising drop-on-demand ink-jet inks and continuous ink-jet inks.
14. Method of authenticating an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good, comprising the steps of:
 - a) measuring an absorbance, reflectance or transmittance spectrum of an article marked by the method according to any one of claims 12 or 13, in the UV and/or visible and/or IR wavelength domain of the electromagnetic spectrum;
 - b) comparing the spectrum measured under a) and/or information derived therefrom with a corresponding spectrum of an authentic item and/or information derived therefrom.
15. Method according to claim 14, wherein said method is carried out by a machine, such as a currency acceptor, a ticket validator, or a hand-held authentication device.
16. Method according to claim 14 or 15, wherein in step a) said spectrum is measured as a vector of digital values representing the absorption and/or reflection and/or

transmission of said marking at a selected number of wavelengths or over a selected number of wavelength domains.

17. Method according to claim 14 or 15, wherein step b) is carried out by deriving the statistically independent hyper-color coordinates of said marking from the vector of digital values measured in step a), and comparing at least one of said hyper-color coordinates with a corresponding reference value of an authentic item, and deriving an authenticity indicator from the comparison result using a pre-established decision criterion.
18. Method for authenticating an article according to one of claims 14 to 17, wherein said spectrum is measured using a combination of a broad-band emitting light source and a plurality of narrow-band sensitive photodetectors, or using a combination of a broad-band sensitive photodetector and a plurality of narrow-band emitting light sources, or using a combination of a broad-band emitting light source and a diffractive or dispersive spectrometer device.
19. Method for authenticating an article according to one of claims 14 to 17, wherein said spectrum is measured using a combination of a plurality of narrow-band emitting light sources, such as LEDs, and a broad-band sensitive imaging device, such as a CCD- or CMOS- camera, yielding spectral or hyperspectral imaging information.
20. Method for authenticating an article according to one of the claims 14 to 19, wherein said statistically independent hyper-color coordinates are derived from the measured spectrum by the means of a mathematical Least-Squares algorithm.

21. Marking, comprising at least one printing ink according to any one of claims 1 to 6 and/or at least one set of printing inks according to any one of claims 7 to 11.
22. Article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good, comprising at least one marking according to claim 21.
23. Use of a dye or pigment having at least one absorption maximum in the visible range of the electromagnetic spectrum which is substantially different from the absorption maxima of the base colors of the CIEXYZ system and/or having an absorption band in the visible range of the electromagnetic spectrum whose band width at half intensity is narrower than 2400 cm^{-1} , preferably narrower than 2000 cm^{-1} , and most preferably narrower than 1500 cm^{-1} , for marking and/or authenticating an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good.
24. Use of a printing ink according to any one of claims 1 to 6 for marking and/or authenticating an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good.
25. Use of a set of printing inks according to any one of claims 7 to 11 for marking and/or authenticating an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good.
26. Use of a marking according to claim 21 for authenticating an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good.

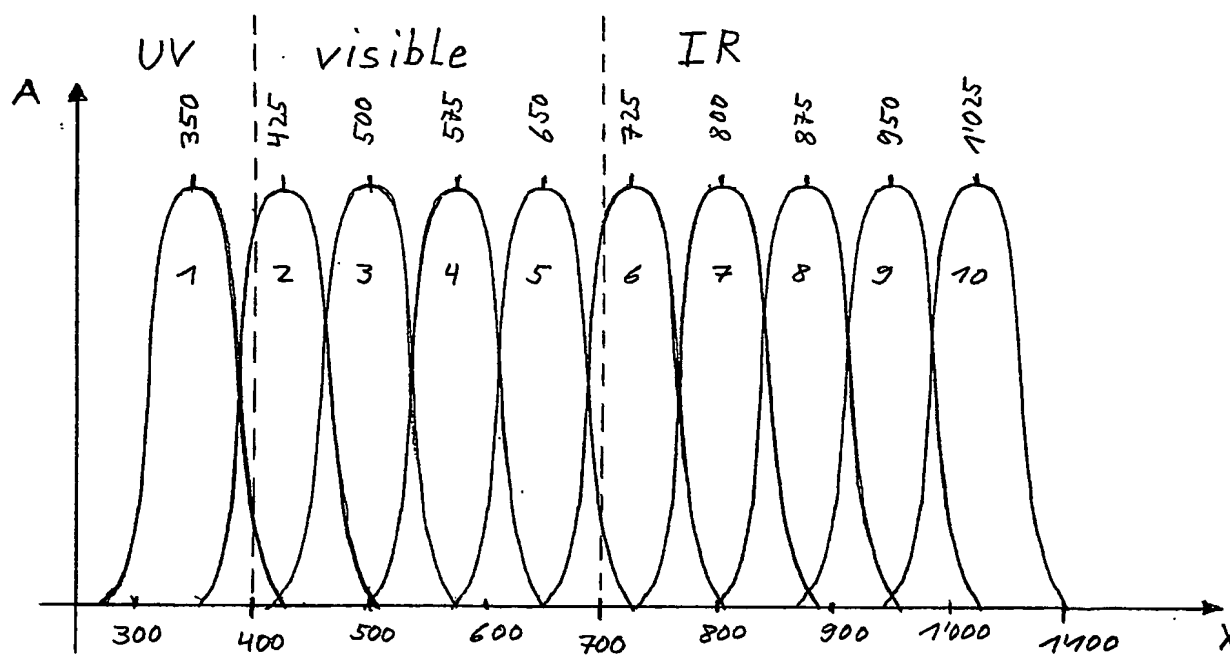
Fig. 1:

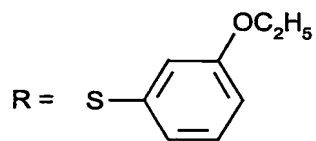
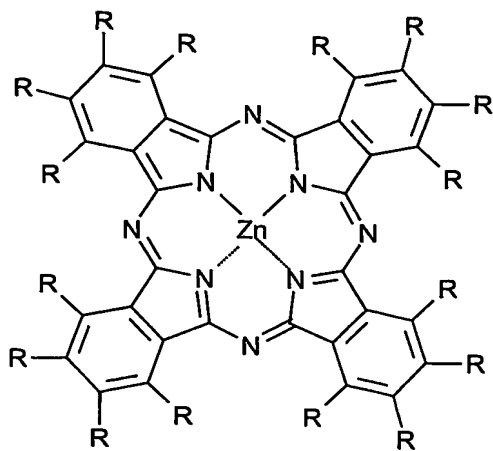
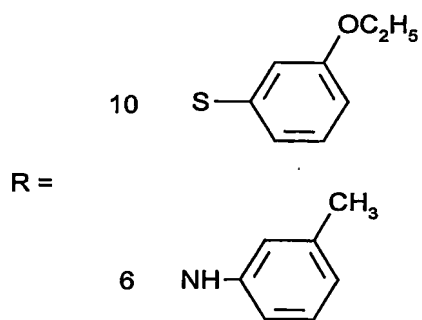
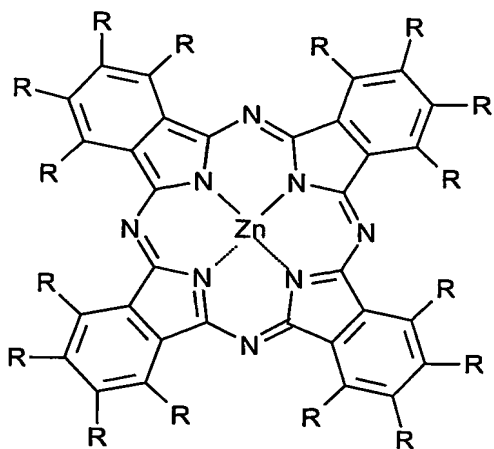
Fig. 2aFig. 2b

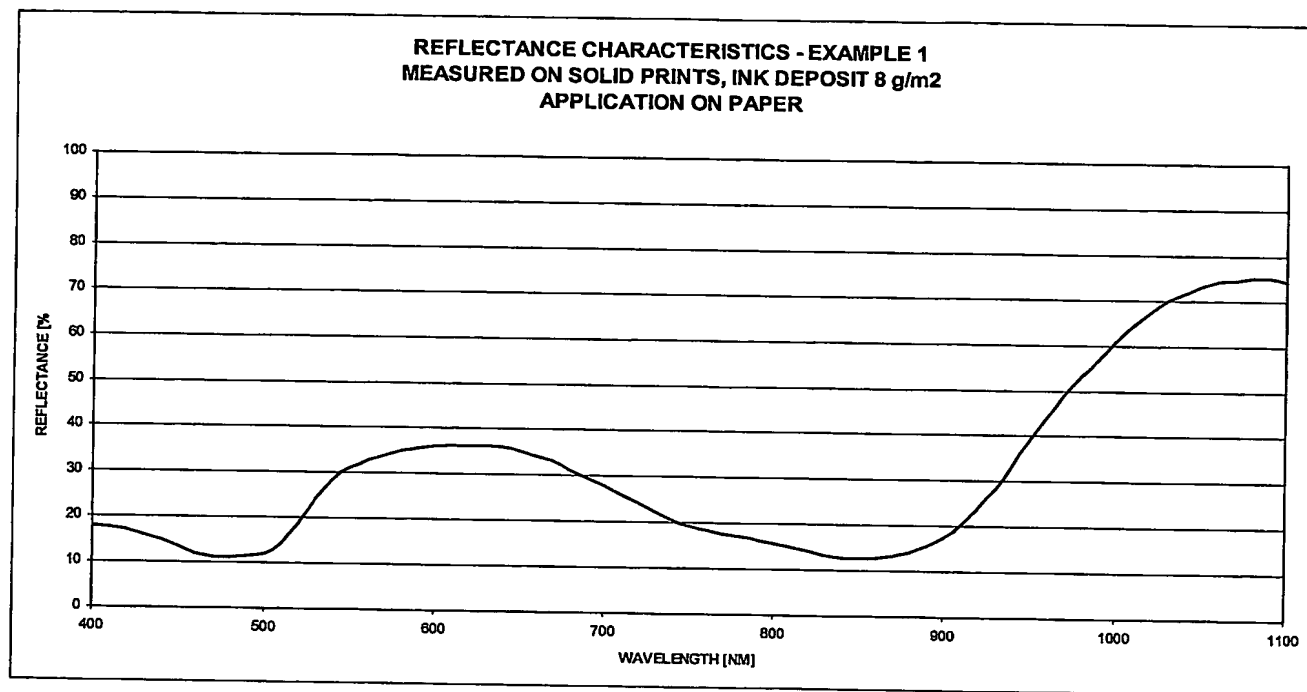
Fig. 3

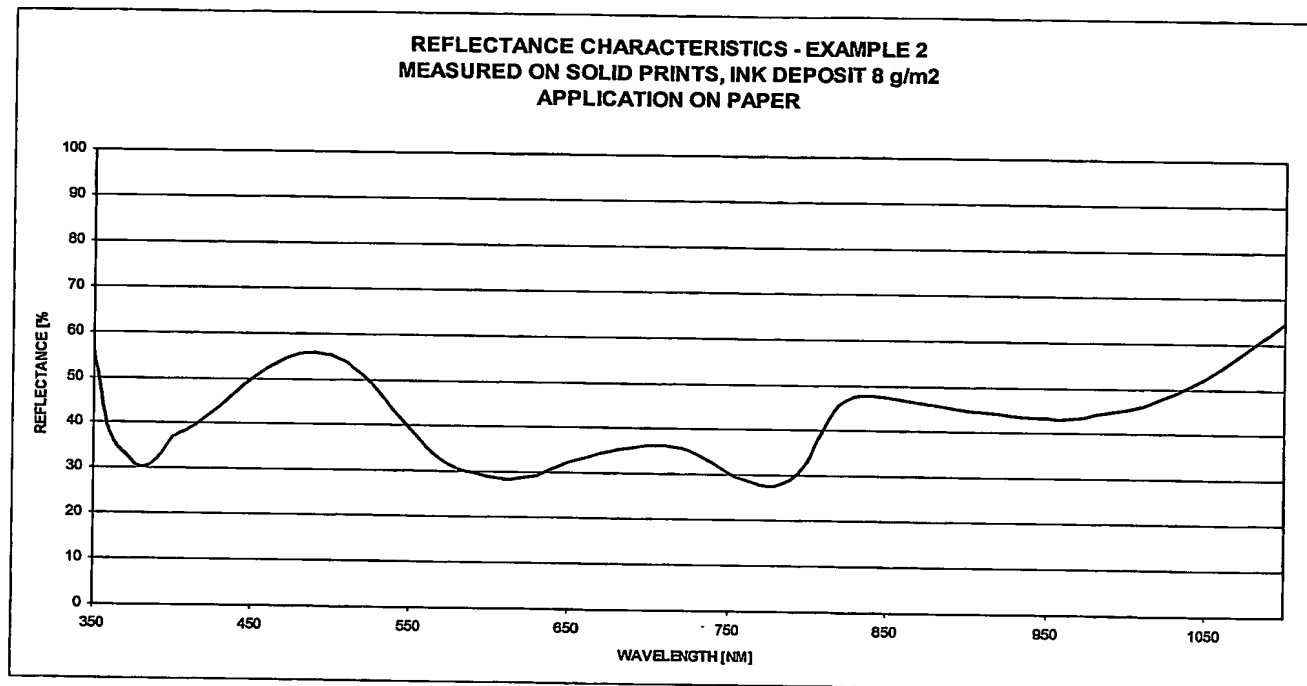
Fig. 4

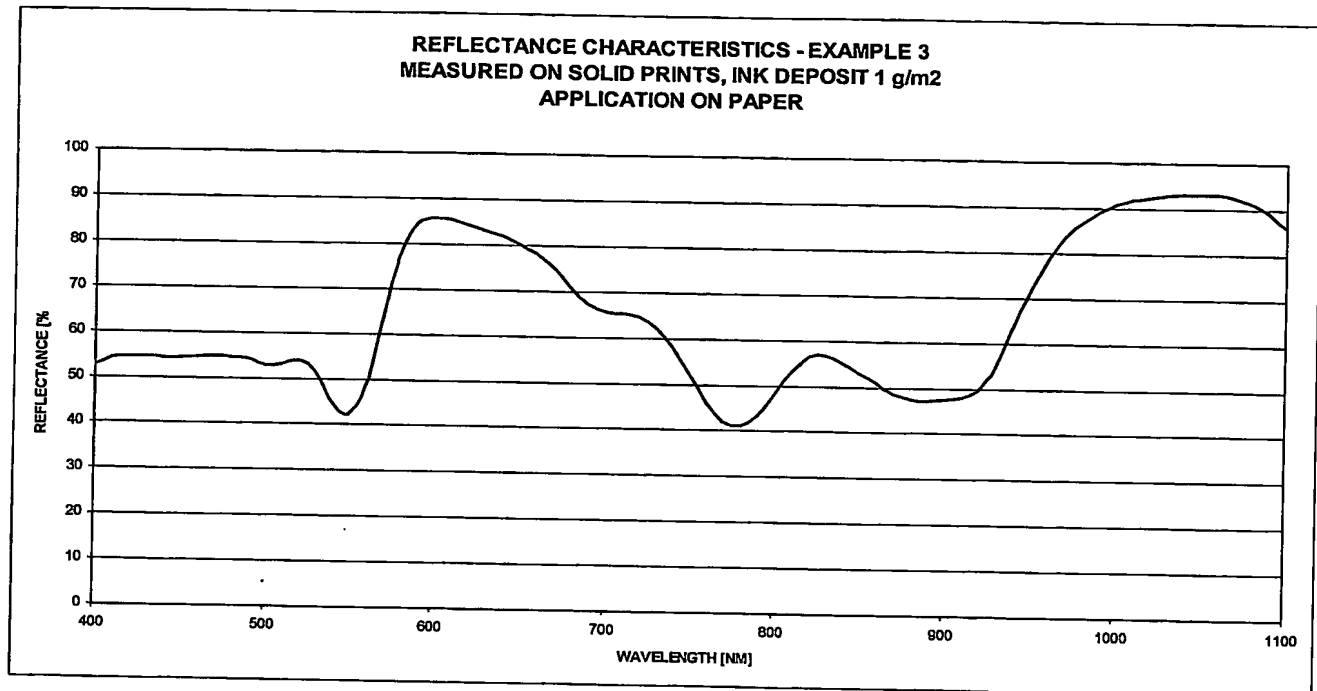
Fig. 5

Fig. 6